**Western Australian Certificate of Education**

**Semester 2 Examination, 2022**

**Question/Answer Booklet**

Please place you student identification label in this box (if required)

**APPLIED**

**INFORMATION**

**TECHNOLOGY**

## Year 12 ATAR: Units 3 & 4

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student Number: | In figures |  |  |  |  |  |  |  |  |  |  |  |
|  | In words |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

## Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

## Materials required/recommended for this paper

***To be provided by the supervisor***

This Question/Answer Booklet

 Multiple Choice Answer Sheet

***To be provided by the candidate***

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators approved for use in this examination, Mathomat and/or Mathaid and/or any system flowchart template

**Important note to candidates**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this Paper

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Suggested working time (minutes) | Marks available | Percentage of examination |
| Section One:Multiple Choice | 15 | 15 | 20 | 15 | 15 |
| Section Two:Short answer  | 8 | 8 | 40 | 99 | 25 |
| Section Three:Extended answer | 1 | 1 | 50 | 30 | 20 |
| Section Four:Scenario | 1 | 1 | 70 | 90 | 40 |
|  |  |  |  | **Total** | 100 |

## Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2022*. Sitting this examination implies that you agree to abide by these rules.
2. Answer the questions according to the following instructions. Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.
3. Write your answers to the questions in Sections Two, Three and Four in this Question/Answer booklet.
4. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
5. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e., give the page number.

## Section One: Multiple-choice 15% (15 marks)

This section has **fifteen** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided.

For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square. Do not erase or use correction fluid. Shade your new answer.

Marks will not be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Suggested working time: 20 minutes.

|  |  |
| --- | --- |
| **Question 1** | **B** |
| **Question 2** | **B** |
| **Question 3** | **A** |
| **Question 4** | **C** |
| **Question 5** | **A** |
| **Question 6** | **C** |
| **Question 7** | **D** |
| **Question 8** | **B** |
| **Question 9** | **C** |
| **Question 10** | **A** |
| **Question 11** | **B** |
| **Question 12** | **B** |
| **Question 13** | **D** |
| **Question 14** | **A** |
| **Question 15** | **D** |

## END OF SECTION ONE

## Section Two: Short answer 25% (99 marks)

This section contains **eight** questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e., give the page number.

Suggested working time: 40 minutes.

Question 16 (13 marks)

1. Desktop Computers for gaming are amongst the most high-performance systems available. Describe three (3) influences the high-end gaming industry has had on hardware component/peripheral specifications for usability. (9 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of **three (3)** ways |  |
| Explains how high-end gaming has influenced specification of hardware component | 3 |
| Describes how high-end gaming has influenced specifications of hardware component | 2 |
| Makes superficial comments about how high-end gaming has influenced specifications of hardware component | 1 |
| **Total** | **9** |
| Sample answers: (any 3)**Enhanced Graphics Processing Units (GPU):*** Due to increasing complexity of vector graphics, virtual reality and high frame rates required for high end gaming, GPUs with large amounts of VRAM and processing power are required.

**Enhanced Networking Capability:*** Minimum lag time and latency is required for high end gaming, ensuring that network interface hardware on gaming units is capable of very high speeds, both wired and wirelessly.

**Monitors with High resolution, high refresh rate screens*** High end gaming requires screens that can keep up with the fast pace of movement with many games. These require high resolutions, true to life colours and higher refresh rates.

**CPU with multiple cores and high clock speed*** High end games utilise multi-core processing to increase performance. High clock speeds are also required to process the complex game algorithms, graphics and physics calculations required in modern games.

**Large capacity, high-speed Solid-State Drives*** Modern games are big. Some can be up to 100GB in size. Gaming PC’s require large secondary storage just to store these games. High speed SSD are an increasingly popular way to deliver faster loading times of game data and gameplay.
 |
| Accept other possible answers |

1. Outline two (2) ways in which the emergence of online software tools and cloud computing has influenced specifications of mobile digital devices. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of **two (2)** ways |
| Describes a link clearly how online software tools have influenced mobile device specifications | 2 |
| Makes superficial comments about how online software tools have influenced mobile device specifications | 1 |
| **Total** | **4** |
| Sample answers: (any 2)**Smaller hard drive capacities:*** Due to software applications and data being stored online and on cloud servers, only a skeleton version of software application or a web browser need be installed on the hard drive of devices. cloud technology allows users to store their personal data, documents, images and more at a single remote location and access it through smaller handheld devices.

**Wireless networking and connectivity only:*** A shift to only having wireless networking, with no explicit wired networking port or communications ports. Since all data is stored on the cloud, there is no need to physically connect to any other devices for backup or storage.

**Reduced processing power required for CPU*** With many software applications now available online and through cloud computing, the need for powerful processors in a mobile device has diminished as all processing and storage takes place remotely.

**Smaller sized tablets and smart devices*** The functionality of apps available via cloud computing has reduced the need for larger hard drive and more powerful CPU’s, meaning overall size of mobile devices are getting smaller without losing functionality.
 |
| Accept other possible answers |

1. (16 marks)

Phil found himself in an emergency, breaking both an arm and a leg after falling off his mountain bike deep in the Dwellingup Forest. Unable to ride back, fortunately, he had his mobile smart phone with him and had both voice and data reception.

a) Besides making a phone call, identify **three (3)** other features of a modern mobile device that would be useful in Phil’s situation and describe specifically how Phil might use each feature. (9 marks)

|  |  |
| --- | --- |
| **Identification** | **Mark** |
| For each of **three (3)** features |
| Identification of valid feature | 1 |
| **Subtotal** | **3** |
| Detailed description | 2 |
| Brief description | 1 |
| **Subtotal** | **6** |
| **Total** | **9** |
| Sample answers: (any 3 of these)**GPS location*** May assist Phil in locating his exact position to assist when advising his position in the forest.

**Internet access*** Phil could access the Internet and look up and medical or first aid information he may need for his injury.

**Flashlight*** If it gets dark, he may use this to attract attention of search and rescue teams.

**High resolution Camera*** May allow images to be taken and sent to paramedics if urgent first aid required for his broken leg

**Improved battery life*** Phone will continue to function for an extended period. May be crucial in communication with rescue services if it takes them a while to get to him.

**Entertainment/Games/Apps*** May help pass the time and take Phil’s mind of the pain of his broken leg if he had something to distract him.

**Voice control/assistance*** If Phil cannot type or use the touchscreen, he may use voice assisted controls or AI to help control his phone.
 |
| Accept other possible answers |

1. Outline two (2) additional development trends in emerging mobile devices from recent years. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of **two (2)** developments |
| Identifies and outlines features of the development trend  | 2 |
| Only lists the development trend with no explanation. | 1 |
| **Total** | **4** |
| Sample answers: (any 2)**Artificial Intelligence (AI)*** adoption and integration of artificial intelligence and machine learning algorithms into applications.

**Augmented reality and virtual reality*** Enhances the real-world environment with digital objects on screen, improving user experience.

**Integration of Internet of Things (IoT)*** Leads to enhanced user interfaces to bridge the gap between connected mobile devices and people.

**Mobile Payments*** Allows mobile shopping and eCommerce.

**Cloud Based Mobile Apps*** Increases storage capacity of device allowing data to be stored remotely and off the device.

**5G Connectivity*** Allows up to 100x speed over 4G with little or no lag allowing more complex apps and technologies to be used with and on the mobile device.

**Integration with wearable technologies*** Allows pairing with wearable devices allowing a wider range of features such as health indicators

**Enhanced Biometrics*** Allows individual characteristics to be used for user identification, including recognition with facemasks and other enhanced methods.

**Enhanced Security*** Integration of blockchain technology for security of data on the device
 |
| Accept other possible answers |

1. Choose one (1) of the emerging trends outlined in part (b) and explain how it improves the usability of the device. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains in detail with valid outline of improved usability  | 3 |
| Vague outline of improved usability | 2 |
| Lists but does not outline improved usability | 1 |
| **Total** | **3** |
| Sample answer:* 5G Connectivity will allow faster transfers of data with less lag, allowing the device to be more usable for business, cloud computing and AI.
* Connectivity with wearable technology will have improved usability for the device as a health and fitness monitoring tool.
* Mobile payments will allow improved usability when engaging in ecommerce and touchless payment at retailers, improving safety in health.
 |
| Accept other possible answers |

1. (20 marks)
2. Describe two (2) characteristics of Transmission Control Protocol/Internet Protocol (TCP/IP) which make it reliable for data delivery. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** characteristics |
| Describes clearly how the characteristic relates back to reliable data delivery  | 2 |
| Makes comments about the characteristic with no mention of reliable data delivery | 1 |
| **Total** | **4** |
| Accept any two of the following**Packet data transfer*** Sent data is organized into small discrete packets which are sent independently through the network to the receiver. These packets are reassembled on the receiver end.
* Small packets of data minimize the risk of large parcels of data being lost at a time, increasing speed and reliability of transfers.

**Recovers data:*** Automatically resends damage, lost or data that is delivered out of order

**Flow control:*** Automatically adjusts the rate at which bytes are sent to match what the receiver can handle, to prevent buffer overflows
* ensuring data is sent and received at rates the network equipment can handle without overloading

**Connections established before sending data:*** Devices must establish a stable connection between sender and receiver before any data is sent
* Prevents lost data and time wastage due to faulty connection.
 |
| Accept other relevant answers |

1. Beside the ‘S’ at the end of the name, explain the difference between HTTP and HTTPS and provide one (1) example with reasons of where HTTPS communication is vital. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly explains difference | 2 |
| Makes superficial comments but does not clearly define the difference | 1 |
| **Subtotal** | **2** |
| Provides a valid example and reasoning | 2 |
| Provides example with no reasoning | 1 |
| **Subtotal** | **2** |
| **Total** | **4** |
| Answers can include:* Communication via HTTP is in plaintext whereas HTTPS communications are encrypted.
* HTTPS communication use Secure Socket Layer (SSL) or Transport Layer Security (TLS) for encryption

Examples can include:* Online banking due to where bank account numbers, passwords and private information may be communicated
* Online shopping where credit card numbers are communicated
* Private messaging where important private and sensitive information may be communicated
 |
| Accept any reasonable answers |

1. State the appropriate IEEE standard for the following: (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Ethernet: 802.3 | 1 |
| Wi-Fi: 802.11xx* Also accept any valid suffixes of the 802.11 standard
	+ a, b, g, n, ac, ax etc.
 | 1 |
| **Total** | **2** |

1. Annotate processes 1 through 5 detailing a web browser on a client PC requesting a web resource via Hypertext Transfer Protocol (HTTP). (10 marks)

**1**

**2**

**3**

**4**

**5**

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **five (5)** processes |
| Correctly annotates process | 2 |
| Makes superficial comments regarding the process | 1 |
| **Total** | **10** |
| Process 1* User enters a URL request via web browser in correct format
* (http://host:port/path/file) … not required to receive mark
 |
| Process 2* Browser transmits the URL into a request message for the HTTP server
 |
| Process 3* Server maps the URL to a file, program or web page under **its** internal directory or index.
 |
| Process 4* Server returns a response message which is either the resource requested by client or an error message
 |
| Process 5* Web browser formats the response from server and displays on screen
 |

1. (10 marks)
2. Explain how consumers participating in online shopping have benefited from User-Generated Content (UGC). (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** descriptions |
| Explains how people researched before UGC* Paid advertisements
* spoke to salespeople
* looked up official product websites
 |
| Explains how people researched before UGC well | 2 |
| Provides basic response about how people researched before UGC | 1 |
| **Subtotal** | **2** |
| Explains how people research products since UGC* Online review sites
* Read feedback and ratings from other actual purchasers
* Research product information and ask questions about the product from social media platforms, review sites and public forums
 |
| Explains how people researched since UGC well | 2 |
| Provides basic response about how people researched since UGC | 1 |
| **Subtotal** | **2** |
| **Total** | **4** |
| * Possible Answers:
* Previously, consumers got information about products through **salespeople**, professional advertisements on TV, magazines or other media, official product website
* Since UGC, consumers read online reviews, ratings from actual other consumers, read reviews from third party sources and independent product forums.
 |
| Accept other possible answers |

1. Describe how a consumer would analyse the validity of a User-Generated Content (UGC) source for the following: (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **three (3)** criteria |
| Clear descriptions with detail | 2 |
| Some relevant facts provided without detailed description | 1 |
| **Total** | **6** |
| Sample answer:**Currency:*** Check when the UGC was published or written. If it is within a year, can be considered current.

**Verifiability:*** Check if the information is from a reliable source. Has there been relevant research or other valid sources agreeing with it.

**Accuracy:*** Check if the information is correct. Do **the facts** and figures make sense and are of correct values.
 |
| Accept any relevant answers |

1. (6 marks)

Refer to the stimulus below and answer the following question:



1. The above ‘Phishing’ attempt is an example of scammers taking advantage of pandemic-related content to initiate an attack. Outline how the following data security measures could be used to protect from threats like this: (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** reasons |
| Clear description of reason | 2 |
| Some relevant or vague reason | 1 |
| **Total** | **4** |
| Sample answer:**Firewall:** * Can be configured to prevent any unrecognized or known fraudulent email domains from reaching the system.

**Anti-Virus software:** * Can be set to prevent any links to unsecured or fraudulent sites from connecting. If the link in the email is clicked, the AV software should prevent the connection from being established if it is not legitimate or warn the user their action could be dangerous.
* Can also prevent a virus from being downloaded from a fake link.
 |
| Accept other relevant answers |

The notification below was generated by a PC’s event log.



1. Outline the role of digital certificates in ensuring a safer browsing experience for the user. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes giving detail about the type of information  | 2 |
| Describes vaguely | 1 |
| **Total** | **2** |
| Sample answer:* Digital certificates are used to verify the trustworthiness of a website.
* A website is assumed to be legitimate if it has been issued a digital certificate from a trusted certification source
* Fake or fraudulent websites will not have a digital certificate from a trusted source.
 |
| Accept other acceptable answers |

1. (8 marks)
2. Explain the difference between a data warehouse and a data mart. (4 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Defines data warehouse correctly | 1 |
| Defines data mart correctly | 1 |
| Explains the difference | 2 |
| **Total** | **4** |
| Sample answer:**Data warehouse:*** A global database for an organisation and stores cumulative data from many sources and departments

**Data mart:*** A subset of a data warehouse holding data only from a specific source or department of the organisation

**Differences:*** Size:
	+ Data warehouse contains more general and large amounts of data. Highlights general trends of the organisation
	+ Data mart contains more directed data and is of a smaller size than a data warehouse. Focuses on single subjects or areas of the organisation
 |
| Accept other answers |

1. Data mining is a useful tool to help retailers understand their customer’s purchasing trends. Outline two (2) ways data can be collected from a customer about their shopping habits. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** reasons |
| Clear description  | 2 |
| Some relevant facts provided  | 1 |
| **Total** | **4** |
| Sample answer:* Search engine queries: recording of recent Internet searches
* Cookies: small text files containing user data like usernames, passwords, shopping carts, labelled with a unique ID for the user and their computer
* Social media activity: voluntary personal information given by the user when creating their profile and preferences
* Credit card transactions: Spending data can be analysed as information about purchases and retailers purchased from are recorded on each transaction.
* loyalty cards: record spending and shopping data which can be used to analyse purchasing habits and trends
* Surveys and competitions: Voluntary information given by the consumer which can be used to analyse spending habits and trends.
 |
| Accept other answers |

1. (14 marks)

A plaintiff is accusing the Australian Government of online defamation after being made aware of a digital document published about her on an internal (not public) Federal website. The document accuses her of some fraudulent behaviour in a previous role as a government employee.

1. Describe two (2) rights she has under the Freedom of Information (FOI) Act to obtain further information about this document. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** rights |
| Describes a right that FOI provides to her in relation to digital documents | 2 |
| States a right that FOI provides to her with no relation to digital documents | 1 |
| **Total** | **4** |
| Any two of the following:* Allows her to view digital information held by most government agencies
* Allows her to force government agencies and ministers to correct or annotate digital information they have about her
* Allows her to request ministers and government agencies release digital documents that would otherwise be exempt from the public.
 |
| Accept other answers |

1. Identify the three (3) requirements to be proven by the plaintiff for online defamation to have occurred. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **three (3)** requirements |
| Explains the requirement clearly | 2 |
| Makes superficial comments about the requirement | 1 |
| **Total** | **6** |
| Sample answer:* Digital document must be communicated or published in an online method to at least one other person other than the plaintiff.
* The digital document must be about the plaintiff. If the plaintiff isn’t named explicitly, the plaintiff must reasonably believe it is about them.
* The digital document must cause reputational or financial damage to the plaintiff
 |

1. Assuming the online defamation has been proven, describe two (2) legal actions available to the plaintiff to counteract the offence. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** legal actions |
| Describes the legal action accurately | 2 |
| Makes superficial comments about the legal action | 1 |
| **Total** | **4** |
| Suggested Answers:* Plaintiff can send the Australian government agency a legal notice asking them to take down the material and make a public correction.
* Plaintiff can sue the Australian government for damages to reputation or financial loss. This must usually be done within a time limit of 1 year from when the digital document was discovered or communicated.
 |
| Accept other answers |

1. (12 marks)
2. List two (2) common types of digital publications. (2 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** types |
| Provide a common type of digital publication (from the list below) | 1 |
| **Total** | **2** |
| Accept any two of the following* ePub
* Portable Document Format (PDF)
* InDesign Document (Indd)
 |
| Accept other relevant answers |

1. Describe two (2) advantages of using a digital publication over other forms of media.

 (4 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** advantages |
| Describes the advantage of the digital publication with detail | 2 |
| Makes superficial comments about the digital publication | 1 |
| **Total** | **4** |
| Accept any two of the following* Can include hyperlinks to external reference sites such as thesaurus, dictionary, and other materials
* Ability to change font size, colour and type. Useful for visually impaired or personal user preference
* Multiple language support
* Can easily incorporate accessibility and inclusivity features
* Saves space. One device can carry many digital publications compared to physical books
* Can be accessed by many devices.
* Can have digital rights management built in.
 |
| Accept other relevant answers |

1. Outline how the following publishing features could be used to enhance a digital publication for the reader. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **three (3)** publishing features |
| Explains how the feature enhances the digital document, relating back to a better reader experience  | 2 |
| Makes comments about the publishing feature but no mention of improved reader experience | 1 |
| **Total** | **6** |
| Accept any two of the following**Frames:*** Helps position images and texts to stay on parts of the page
* Creates an orderly framework for all content and images

**Colour schemes:*** To cater for different reader audience preferences.
* To suit visually impaired readers (colourblind readers etc.)

**Layers:*** Used to separate content into different levels on a page
* Can be used to create an organized structure for the viewer where similar elements can be placed on different levels within the page instead of having them all embedded on the same page. Eg. All meta data, references, citations can be placed on one layer, multimedia and animations on another layer, all feeding off the main information layer.
* Creates faster loading and more responsive pages for the viewer but full content can still be accessed without sacrificing functionality
 |
| Accept other relevant answers |

##

## END OF SECTION TWO

## Section Three: Extended answer 20% (3 marks)

This section contains **one** question. You must answer **all** parts to the question. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e., give the page number.

Suggested working time: 50 minutes.

**Disaster Recovery…**

*Fires and explosions aren’t necessarily the most common types of workplace accidents, but when they occur, they are often catastrophic for the company or organisation. Even if employees escape harm or injury, the consequences of fires can be extremely expensive and disruptive for businesses, especially if network infrastructure has been destroyed in the fire and needs to be replaced.*

In 2021, a computer modelling company called X-Solutions had their offices completely destroyed by fire when a high-end workstation overheated because an employee, without permission, used it to mine cryptocurrency over a long weekend. The fire destroyed the whole office, including the company servers and all networking equipment.

Fortunately, X-Solutions utilised a cloud-based backup service, so there was minimal loss of data, but reviving the office and getting connected back to the Internet proved to be a very long and difficult process.

Furthermore, the investigative team were hampered in finding the individual responsible for the incident due to the following procedural issues written up in an after-incident report:

* Network logs showed logins and passwords were shared amongst the employees on most of the company workstations.
* There were no working policies in place for using company workstations.
* Inadequate records of hardware maintenance.

After the incident, X-Solutions immediately hired a consultant to remedy the three salient points to ensure a repeat of the incident could not occur.

1. (30 marks)
2. Outline specifically how an audit trail and disaster recovery plan could have been used by X-Solutions in the aftermath of this incident. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** descriptions |
| Explains the security technique and how it would be used effectively | 2 |
| Makes superficial comment(s) about the security technique and its use | 1 |
| **Total** | **4** |
| **DRP:*** Documented process or procedures to recover IT infrastructure after the fire
* Specifies procedures to follow after the fire
* Would be used to recover data and reinstate IT services as quick as possible

**Audit Trail:*** Chronological record providing evidence of sequence of activities relevant to the system
* Shows timestamps of logins, transactions, any network activity, communications, access by users
* Would be used to trace back the events and activities leading up to the fire. Could be used to identify who and when the PC was instructed to mine for cryptocurrency after hours.
 |
| Accept other answers if evidenced from the article |

The NBN fibre optic line to X-Solutions’ offices were so severely damaged in the fire that full hardware restoration would take 8 days. During this down time, the company decided to set up a temporary local file server system. The company had a Recovery Point Objective (RPO) of 6 hours. This means they should have a backup system in place such that they would never lose any data over 6 hours old.

1. On the planner below, outline a suitable data backup schedule which includes appropriate combinations of data backup types. (3 marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
| Full Backup and incremental after every 6 hours | Incremental or Differential every 6 hours | Incremental or Differential every 6 hours | Incremental or Differential every 6 hours | Incremental or Differential every 6 hours | Incremental or Differential every 6 hours | Incremental or Differential every 6 hours |
| Day 8 |
| Full Backup and incremental after every 6 hours |

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Two Full backups located approximately 7 days apart | 1 |
| Incrementals every 6 hours on other days. Differentials can also be used for the intervals, although in practice, would be impractical over incremental backups* **If backup type is mentioned without time intervals, only 1 mark given**
* **Interval times can also be given as real times. Eg. 12:00am, 6:00am, 12:00pm, 6:00pm etc.**
 | 1-2 |
| **Total** | **3** |

1. Outline two (2) reasons for your choice of schedule and backup techniques used.
 (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** reasons |
| Provides clear outline | 2 |
| Vague outline | 1 |
| **Total** | **4** |
| Possible answers could include any of the two:* Full backup every 7 days is a logical interval as will provide a reduced time to restore if there is another disaster instead of dealing with multiple incremental and differentials.
* An incremental or differential backup every 6 hours will ensure RPO is observed
* This scheme will mean only data that has been changed or amended every 6 hours will be backed up, saving time and wear and tear on hardware.
* Incremental backup will only backup data that has changed since the last backup, whatever that may have been, full, incremental, differential.
 |
| Accept other relevant answers |

1. After all physical repairs had been completed, X-Solutions was told by their NBN provider it would take a further 28 days for full Internet services to be restored, well beyond the contracted time for restoration of service. State the document which outlines the NBN provider’s responsibilities for providing service to X-Solutions.
 (1 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly states Service Level Agreement (SLA) | 1 |
| **Total** | **1** |

1. Outline two (2) specific components of the document identified in part (d) that would provide guidance to X-Solutions regarding their situation with their NBN provider. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** reasons |
| Identifies component and provides clear outline | 2 |
| Lists component but no adequate description | 1 |
| **Total** | **4** |
| Possible answers could include any of the two:**Response and issue resolution timeframe:** * specifies period by which current service issue should be resolved or fixed

**Services desired responsiveness level:** * indicates ability to perform desired outcome after the customer requests it.

**Repercussions for service provider not meeting commitments:** * Outlines consequences for due to lack or failure of service and customer’s rights to compensation or refunds.
 |
| Accept other relevant answers |

The article mentions that an after-incident report suggested, inadequate policies around the use of company IT resources was a factor leading to the incident and also created difficulties tracking down the employee responsible.

1. Describe two (2) additions to X-Solutions’ employee code of conduct regarding ‘Use of Company IT resources’ that would help prevent another similar occurrence.
 (4 marks)

***Use of Company IT resources:***

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** additions |
| Clear descriptions | 2 |
| Some relevant facts provided  | 1 |
| **Total** | **4** |
| Sample answer:**Use of Company IT resources*** Internet and other digital resources provided in the workplace shall only be used for work purposes.
* Users must use their own personal login for access to the network
* Company resources must only be used within work hours
 |
| Accept any relevant answers |

1. Describe two (2) issues X-Solutions faced because they utilised cloud computing to back up their data. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** issues |
| Clear description and issue is specific to X-Solutions | 2 |
| Some relevant facts provided, or issue is not directly related to X-Solutions | 1 |
| **Total** | **4** |
| Sample answer:**Level of accessibility:** * Lack of NBN access after the incident has led to cessation of cloud networking in the short term. Access to data and files from remote locations may be limited.

**Availability of online applications:** * Lack of NBN access means powerful cloud applications may not be available due to low bandwidth and data transfer speeds.
 |
| Accept any relevant answers |

Until X-Solutions’ network could be resolved back to the cloud, a local area network was set up at the newly rebuilt office site, meaning network security had to be revised.

1. Describe appropriate security measures that X-Solutions should implement at the following levels: (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **three (3)** levels  |
| Clear descriptions of the security measure | 2 |
| Some relevant facts provided or just identifying measure without description | 1 |
| **Total** | **6** |
| Sample answer:**User:*** Two step authentication with either PIN, FOB or biometric
* Do not accept password

**Server:*** Install firewall to detect and prevent unauthorised access or intrusion from external source
* Anti-malware software installation to prevent malicious external attacks or threats
* Communication in and out of network through public key or other type of secure encryption
* **Do not accept any physical security measures in this part**

**Physical:*** Video surveillance of server room
* Locked secure doors and cabinets for equipment
 |
| Accept any relevant answers |

## END OF SECTION THREE

**Section Four: Scenario 40% (90 Marks)**

There is **one** question in this section. You must answer **all** parts of the question.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
* Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e., give the page number. Fill in the number of the part of the question that you are continuing to answer at the top of the page.

Suggested working time: 70 minutes.

**Question 25 (90 Marks)**

JHB is a lifestyle shopping centre in the Southern suburbs. The centre promotes all facets of healthy living, including a range of cafes and restaurants, organic supermarkets and a selection of boutique health and wellness facilities, including a gym, health spa and day care facility.

The centre has been open for two years and has enjoyed much success. It is currently in the process of expanding and subsequently wishes to increase its customer base and brand footprint within the local community, promoting itself as a health-conscious alternative to mainstream shopping.

JHB have engaged you to design a website for the centre and a customer loyalty application (app) for mobile devices, which among other things, allows members to view their customer loyalty points.

The timing of the website creation falls within a structured project management approach, along with the rest of the expansion project.

For the loyalty app, JHB have requested that you engage with the various retailers within the centre to integrate their ongoing feedback to how the final product should look and feel.

**The website homepage should include the following:**

* Logo in an appropriate position for maximum brand awareness
* large image slider featuring images of expansion plans and new stores opening
* Content boxes, placed in a prime location, featuring weekly news and store competitions
* Content boxes on healthy eating and wellbeing activities
* Link to Loyalty Members section and login
* The following menu selections:
	+ About us
	+ Shop
	+ Eat & Drink
	+ Wellness
	+ Opening hours
	+ Centre Services (with submenus)
		- Parking
		- Getting here
		- Centre map
		- Visiting with kids and day care
* Emphasised button with link to download Customer Loyalty Mobile App
* Social media links

**The loyalty app should include the following:**

* Logo in appropriate position for maximum brand awareness in a mobile app
* Appropriately placed icon linking to digital version of loyalty card
* Large screen area dedicated to the number of loyalty points accumulated
* Content boxes displaying redeemable rewards
* Content box with a graphic and link to latest digital catalogue
* Sliding viewer showing latest JHB member offers
* Appropriate mobile app menus for the following:
	+ Home
	+ Savings/Offers
	+ Activity
	+ Settings
	+ More
		- Feedback
		- Chat to us
		- Read/Leave store reviews
		- Rate your visit
		- FAQ
		- Login

**Question 25** (continued)

1. Outline, with reasoning, which stage within a structured management approach for the shopping centre expansion would most likely include the creation of the website. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Identifies stage and gives acceptable reasons | 2 |
| Identifies stage with no reasoning | 1 |
| **Total** | **2** |
| Sample answers:Production or Planning stages* If states Planning stage, reasoning is that the website needs to be planned before created, this is valid
* If states production stage and explains that creative tasks such as website creation normally takes place in the production stage of a structured project.
 |
| Accept other appropriate reasoning |

1. Identify the project management approach best suited to the development of the Mobile Loyalty App and justify your selection. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Prototyping | 1 |
| **Subtotal** | **1** |
| Explains in detail why chosen project management type is appropriate for mobile app | 3 |
| Explains why chosen project management type is appropriate but lacks detail | 2 |
| Makes superficial comments about the chosen project management approach | 1 |
| **Subtotal** | **3** |
| **Total** | **4** |
| Sample answer:* Prototype suited for small scale projects such as app development
* Continual integration of feedback from stakeholders is a required part of the app development, which is appropriate for prototyping
 |
| Accept other appropriate answers |

1. Outline how the following project planning tools could be used in the design of the website and mobile app for JHB. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** planning tools |
| Describes how the tool may be used during the development of website or mobile app | 2 |
| Makes superficial comments about how the tool may be used during development of website or mobile app | 1 |
| **Total** | **4** |
| Answers could include:**Site map:*** Used to provide an overall view of pages on the website, organised hierarchically, allowing page links to be seen and edited easily
* Useful for both website and mobile app

**Storyboard**:* Used to provide a graphical overview of each page and the flow of pages into each other
* Can be used for website and mobile app but will have particular benefit in providing a feel for stakeholders how all graphical elements fit together.
 |
| Accept other answers |

1. Describe two (2) graphical user interface (GUI) features you would include on the website to cater for the intended target audience. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** features: |
| Describes GUI feature and how it caters to intended target audience | 2 |
| Describes GUI with no reference to intended target audience | 1 |
| **Total** | **4** |
| Intended Target Audience are shoppers, health-conscious people, parents etc.Sample answers could be:* Clear structured menu system with kinds of retailers for categorical structure
* Familiar identifiable icons to represent selections and buttons such as shopping carts, person icon for logins, scales for wellbeing, social media logos etc.
* Use of warm, calming colours such as golden yellows, natural greens and browns to signify wellbeing and health
* Simple, organised and uncomplicated layout of features making selections and menus easy to find for the busy shopper
 |
| Accept other answers |

1.

(i) Explain how your website will reflect compliance with W3C Accessibility standards. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains how the website will reflect accessibility W3C standard | 3 |
| Describes how the website will reflect the accessibility W3C standard | 2 |
| Makes superficial comments about how the website will reflect the accessibility W3C standard | 1 |
| **Total** | **3** |
| Sample Answer:**Website will be fully integrated to provide:*** Alt-Text for images
* Captions for audio and video
* Use sufficient contrast for readability for visually impaired
* Helps users avoid mistakes… confirmation dialogue boxes etc.
 |
| Accept other answers |

(ii) Explain how your mobile app will reflect compliance with W3C Mobile Web standards. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains how the mobile app will reflect mobile web W3C standard | 3 |
| Describes how the mobile app will reflect the mobile web W3C standard | 2 |
| Makes superficial comments about how the mobile app will reflect the mobile web W3C standard | 1 |
| **Total** | **3** |
| Sample Answer:**Mobile App will:*** Meet growing demand for a quality mobile experience
* Include a responsive CSS design to adapt to different screen sizes and operating systems.
* Use advanced mobile browser technologies including features from HTML 5, rich JavaScript API’s
 |
| Accept other answers |

1. Design the homepage for the JHB Shopping Centre website in the space provided on the following page.

You may use the space below to plan your response.

Your design must include annotations and show:

1. layout and structure of your intended design (9 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Placement of logo and images to raise the Family Tides brand awareness* Top left corner according to rule of reading gravity
 | 1 |
| Large image slider directly under header | 1 |
| Weekly news and store competitions content boxes in prime location | 1 |
| Content boxes on healthy eating and wellbeing activities | 1 |
| Link to Loyalty Members section and login | 1 |
| Hierarchical menus in appropriate location (all submenus must be included for 2 marks)* If submenus missing only give 1 mark
 | 2 |
| Emphasised button Link for Mobile app | 1 |
| Social medial links | 1 |
| **Total** | **9** |

1. elements and principles of design used and the relationship between them

 (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly identified element in their design | 1 |
| Correctly identified principle in their design | 1 |
| Relationship between the element and principle correctly annotated | 1 |
| **Total** | **3** |
| **Elements of design** * line
* shape
* space
* texture
* colour
* 3D form
* tone
 | **Principles of design** * balance
* emphasis (contrast and proportion)
* dominance
* unity (proximity and repetition)
* pattern
* movement
 |
| **Examples of Relationship between the element and principle*** Balance creates a feeling of equal weight on both sides of the design using lines, shape, space and colour.
* Emphasis is the quality that draws your attention to a certain part of the design first. This can be done with contrasting colour, varying shape sizes, different shapes, images and 3D form.
* Unity is when a design looks right – a coherent whole. This can be created with repeating lines and shapes, harmonious colour with a common hue, similar textures or tones
 |
| Accept other answers |

1. organisation of content suitable for the given digital medium (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Design features logical and practical organisation of content for the given digital medium and includes supporting annotations. | 3 |
| Design shows some practical organisation of content for the given digital medium and some relating annotations. | 2 |
| Design shows limited organisation of content for the given digital medium and inadequate or no annotations. | 1 |
| **Total** | **3** |
| Sample answer:* Content should be organised in a way that makes it accessible to the users. The website home page should have sections (windows) of written content, images and logical navigation with space around these elements. The content should have a hierarchy with the most important content in a prominent position on the home page. The aim of these digital solutions is to increase footprint of the ‘JHB Shopping Centre’ brand and to provide information about health-conscious shopping.
 |
| Accept other answers |

1. user-generated content feature(s) suitable for the given digital medium
 (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Produces a design that clearly indicates user-generated content features and detailed supporting annotations | 3 |
| Produces a design that shows some user-generated content features and includes some supporting annotations. | 2 |
| Produces a design that shows some user-generated content features for the given digital medium but inadequate or no annotations | 1 |
| **Total** | **3** |
| Sample answer inclusions can be:* member review section
* forum where members or public can leave feedback or news
* a blog which invites people to comment
* any type of form that collects information from users or members
* social media such as tweets from twitter, Instagram images
 |
| Accept other answers |

1. navigation controls suitable for the given digital medium (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Produces an effective representation of appropriate navigation controls for the website that includes detailed supporting annotations | 3 |
| Produces a representation of navigation controls for the website that includes some supporting annotations | 2 |
| Produces a limited representation of navigation controls for the website that includes inadequate or no annotations. | 1 |
| **Total** | **3** |
| Possible navigation tools:* Hierarchical menus
* Breadcrumbs
* Sliders or radio buttons for scrolling through slideshows
* Hyperlinks to landing pages or specific information elsewhere on the site
 |
| Accept other valid navigation tools for a desktop application |

1. one (1) accessibility feature (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Produces a design that includes one accessibility feature and supporting annotation. | 2 |
| Produces a design that includes one accessibility feature with no supporting annotation | 1 |
| **Total** | **2** |
| **Possible accessibility features:*** Font resizable
* Alternate text for images
* Screen readers, text to voice
* Colour blind friendly colour schemes
 |
| Accept other valid accessibility features |

1. JHB have asked if you could edit some video footage of the shopping centre expansion for the website. Explain how the following video application features could enhance the final sequence. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** video application features |
| Describes the video application feature and how it may enhance the sequence.  | 3 |
| Outlines the video application feature and how it may enhance the sequence.  | 2 |
| Makes superficial comments about the video application feature and how it may enhance the sequence. | 1 |
| **Total** | **6** |
| Sample answer:**Transitions:** * Can enhance the sequence by creating different ways to move from one scene to another rather than just straight cuts.

**Effects:** * Can create moods or themes within the sequence by additional visual features or animations.
* May enhance the sequence with addition of special effects via green screen or other cinematography method.
 |
| Accept any relevant answers |

1. With the schedule for website launch being so tight, you decide to outsource the video editing to an overseas firm specialising in video editing. Describe two (2) advantages of outsourcing this job to the global market. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each ofthe **two (2)** advantages |
| Describes the advantage and reference to the global market | 2 |
| Only describes the advantage with no reference to global market | 1 |
| **Total** | **4** |
| Any two of the following:* Global market offers cheaper labour offshore as cost of living may be less in other countries.
* Some overseas countries may have expertise in technologies and processes allowing a better product or service than if done locally.
* Creating relationships with good operators overseas may offer expansion of reciprocal business or services into the global market
* Allows her to request ministers and government agencies release digital documents that would otherwise be exempt from the public.
* The global market may provide access to technologies and services that are too expensive or not available on the local market
 |
| Accept other answers |

1. Design the home page of the ‘JHB Loyalty’ mobile app on the smart device portrait template provided on the following pages.

You may use the space below to plan your response.

Your design must include annotations and show:

1. layout and structure of your intended design (8 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Placement of logo and images to raise the Family Tides brand awareness* Either top left corner or top centre are ideal for mobile apps
 | 1 |
| Appropriately placed icon linking to digital version of card* Either top left or right corner would be most appropriate
* Accept any reasonable position
 | 1 |
| Large screen area dedicated to accumulated loyalty points | 1 |
| Content box for rewards redeemable | 1 |
| Content box with link to digital catalogue | 1 |
| Slider viewer with latest JHB member offers | 1 |
| Appropriate **icon** **symbols** for menu buttons **(all sub-menus must be shown for 2 marks, otherwise just 1 mark given)*** **No text menus as these are not suitable due to low screen real estate on a mobile app**
	+ Home – can be represented by ‘monopoly house’ symbol
	+ Savings/Offers – can be represented by $ symbol
	+ Settings – can be represented by ‘gear’ symbol
	+ More – can be represented by ‘…’ symbol
	+ Accept any other appropriate icon.

Examples include: * + - magnifying glass symbol for ‘Search’
		- person symbol for ‘Login’
		- bell for ‘Alerts’
		- etc.
* Must also show drop down menus for
	+ Feedback
	+ Chat to us
	+ Read/Leave store reviews
	+ Rate your visit
	+ FAQ
	+ Login
	+ These can be shown as text
 | 2 |
| **Total** | **8** |

1. elements and principles of design used and the relationship between them

 (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly identified element in their design | 1 |
| Correctly identified principle in their design | 1 |
| Relationship between the element and principle correctly annotated | 1 |
| **Total** | **3** |
| **Elements of design** * line
* shape
* space
* texture
* colour
* 3D form
* tone
 | **Principles of design** * balance
* emphasis (contrast and proportion)
* dominance
* unity (proximity and repetition)
* pattern
* movement
 |
| **Examples of Relationship between the element and principle*** Balance creates a feeling of equal weight on both sides of the design using lines, shape, space and colour.
* Emphasis is the quality that draws your attention to a certain part of the design first. This can be done with contrasting colour, varying shape sizes, different shapes, images and 3D form.
* Unity is when a design looks right – a coherent whole. This can be created with repeating lines and shapes, harmonious colour with a common hue, similar textures or tones
 |
| Accept other answers |

1. organisation of content suitable for the given digital medium (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Design features logical and practical organisation of content for the given digital medium and includes supporting annotations. | 3 |
| Design shows some practical organisation of content for the given digital medium and some relating annotations. | 2 |
| Design shows limited organisation of content for the given digital medium and inadequate or no annotations. | 1 |
| **Total** | **3** |
| Sample answer:* Content should be organised in a way that makes it accessible to the users. The mobile app home page should have a header for logos, logins, etc, a well-defined content section and a footer containing menu icons. The content should have a hierarchy with the most important content in a prominent position on the home page.
 |
| Accept other answers |

1. navigation controls suitable for the given digital medium (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Produces an effective representation of appropriate navigation controls for the website that includes detailed supporting annotations | 3 |
| Produces a representation of navigation controls for the website that includes some supporting annotations | 2 |
| Produces a limited representation of navigation controls for the website that includes inadequate or no annotations. | 1 |
| **Total** | **3** |
| Possible navigation tools:* Touchscreen gestures such as pinching and swiping suitable for a mobile device
* Sliders for scrolling through slideshows
* Icons representing buttons containing hyperlinks to landing pages or specific information elsewhere on the site
 |
| Accept other valid navigation tools for a mobile device |

1. user-generated content suitable for the given medium (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Produces a design that clearly indicates user-generated content features and detailed supporting annotations | 3 |
| Produces a design that shows some user-generated content features and includes some supporting annotations. | 2 |
| Produces a design that shows some user-generated content features for the given digital medium but inadequate or no annotations | 1 |
| **Total** | **3** |
| **User-generated content:*** Rate your visits
* Leave a shop review
* Feedback
* Chat to us
 |
| Accept any reasonable answer. |

JHB have requested that you integrate a Content Management System (CMS) when creating the website and mobile app so they can keep content up to date once they are up and running.

1. Describe two (2) advantages for JHB of using a CMS. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two (2)** advantages |
| Describes advantage of CMS and how it can relate to JHB | 2 |
| Makes superficial comment about an advantage of a CMS with no relation to JHB | 1 |
| **Subtotal** | **2** |
| **Total** | **4** |
| Answers can include:**Ease of use:** * Most CMS use a graphical user interface so even people with limited technical knowledge of HTML can use the software.

**Easy to manage content:** * A CMS makes it easy to publish and unpublish content to keep websites up to date.

**Accessible from anywhere**: * A CMS can be cloud-based or on premises, but users can access content from anywhere with a device that's connected to the internet.

**Allows multiple users**:* A CMS makes it easy to manage publishing permissions so more than one employee can manage content

**Instant content updates**: * A CMS enables users to manage and update content in real time -- without needing to wait for a web developer or programmer to make changes.

**Easy to scale:** * A CMS makes it easy for businesses to add new web pages as their business grows without the need to engage a developer.
 |
| Accept other reasonable responses |

* + 1. Customers joining JHB’s loyalty program will need to complete online forms. Explain, using examples, three (3) different validation techniques that can be used in this process. (9 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **three (3)** validation techniques |
| Explains, using examples, a validation technique used for a relevant online form used by JHB | 3 |
| Describes, using example, a validation technique that may not be for a relevant online form used by JHB | 2 |
| Makes superficial comments about a validation technique that can be used but no relevant example provided | 1 |
| **Subtotal** | **3** |
| **Total** | **9** |
| Answers can include:**Range Check:*** Checks that numbers entered are within a defined range, for example, checking dates of birth.

**Field Check:*** Checks that all required fields have been entered. Required fields are often symbolized with an asterisk (\*). Example being First name or Last name.

**Length Check:*** Checks that the entered field is of a required length or does not exceed a limit. An example would be for passwords, or a postcode check.

**Format Check:*** Checks the data is in the correct format. Again, postcodes, or number of children etc. would require a number and not a letter.

**Email verification:*** Checks that an entered email address is valid.
 |
| Accept other reasonable checks |

**END OF MARKING KEY**

**ACKNOWLEDGEMENTS**

|  |  |
| --- | --- |
| **Question 24** | Image from: Free for commercial use by Pixabay Retrieved from: <https://pixabay.com/vectors/cd-dvd-cd-rom-disk-compact-disc-158501/> |